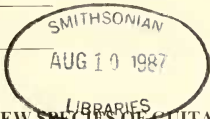


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**RHINOBATOS PUNCTIFER, A NEW SPECIES OF GUITARFISH
(RHINOBATIFORMES: RHINOBATIDAE) FROM THE RED SEA,
WITH NOTES ON THE RED SEA BATOID FAUNA**

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ABSTRACT: A new species of guitarfish, *Rhinobatos punctifer*, is described from a single 705-mm specimen from the Gulf of Aqaba, Red Sea. Apparently the specimens reported as *R. schlegelii* by Gohar and Mazhar (1968) from Suez were the same species. *Rhinobatos punctifer* belongs in the subgenus *Rhinobatos*. It is characterized by a moderately long, angular, blunt-tipped snout (preoral snout 2.8 times mouth width); broad rostral ridges well separated along their length; large eyes (greatest eye diameter 1.3 times interorbital space); oblique broad nostrils, their width 1.3 in mouth width; mouth nearly straight, its width 6.7 in distance from snout to anus; origin of dorsal fin posterior to pelvic bases by a distance 1.5 in interdorsal space; regularly spaced, small white spots on head, disc, pelvic fins, and tail; no pale edge on snout.

INTRODUCTION

Norman (1926), in a revision of the guitarfish genus *Rhinobatos* Linck, 1790, reported two species from the Red Sea: *R. halavi* (Forsskål 1775), and doubtfully *R. thouni* (Anonymous 1798). In *Fishes of the Red Sea and Southern Arabia*, Fowler (1956) accepted these two species and listed also *R. schlegelii* Müller and Henle, 1841 and *R. granulatus* Cuvier, 1829. Fowler based his inclusion of *R. schlegelii* on a listing by Zugmayer (1913), who reported the species from Oman, not from the Red Sea. (Norman [1926] gave the distribution of *R. schlegelii* only as China and Japan.) Fowler (1956) specifically listed the Red Sea

among the localities for *R. granulatus*; but he examined no Red Sea material, and neither of the references he gave with the species included the Red Sea. Nor could Fowler have been citing the Red Sea record of *R. granulatus* by Bamber (1915) because Fowler followed Norman in considering this a misidentification of *R. halavi*. We, therefore, regard Fowler's (1956) record of *R. schlegelii* from the Red Sea as false and that of *R. granulatus* as very doubtful.

Gohar and Mazhar (1964) reported four white-spotted specimens of *Rhinobatos*, "ranging from 62 to 80.5 cm in length," from the Suez market as *R. schlegelii*. Apparently their specimens were not retained.

The junior author obtained a specimen from fishermen in the Gulf of Aqaba, Red Sea, which appears to be the same species as that reported as *R. schlegelii* by Gohar and Mazhar (1964). Com-

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parison of this specimen with published accounts and material of species of *Rhinobatos* convinced us that it is not *R. schlegelii* but a new species that we name *R. punctifer*. The holotype has been deposited in the Bernice P. Bishop Museum, Honolulu (BPBM). Specimens of related species were examined at the British Museum (Natural History), London (BM [NH]). Photographs are provided herein of the holotype (Fig. 1) and of specimens of two other species of the genus that have been recorded from the Red Sea, *R. halavi* (Fig. 2) and *R. thouin* (Fig. 3). (The photo of *R. thouin* is of an Indonesian specimen; we have not seen Red Sea material of this species.)

The new species falls in Norman's (1926) subgenus *Leiobatus* Rafinesque, 1810 of the genus *Rhinobatos*. However, because of the inclusion of *R. rhinobatos* (Linnaeus, 1758) in *Leiobatus* and the assignment of *R. rhinobatos* as type species of *Rhinobatos* by absolute tautonymy, *Leiobatus* of Norman should be considered a junior synonym of the subgenus *Rhinobatos* Linck, 1790. Norman (1926) listed seven species in *Leiobatus* (*Rhinobatos*), *R. schlegelii*, *R. rhinobatos*, *R. holcorhynchus* Norman, 1922, *R. formosensis* Norman, 1926, *R. annandalei* Norman, 1926, *R. lionotus* Norman, 1926, and *R. hynnicephalus* Richardson,

1846. Additional species include *R. albonaculatus* Norman, 1930, *R. irvinei* Norman, 1931, and *R. punctifer*. All of the species in Norman's subgenus *Leiobatus* agree in having a moderately long, pointed, angular snout and anterior nasal flaps extending medially onto the internasal space but not nearly meeting on the midline of the snout.

Rhinobatos punctifer can be distinguished from all other species in this group by a combination of characters including its broad but elongated and angular snout, broad, well-separated rostral ridges, reduced spination, and white spots. Characters distinguishing *R. punctifer* are presented in the diagnosis below.

Rhinobatos punctifer, new species

Figure 1

HOLOTYPE.—BPBM 20843, 705 mm total length, adolescent male, Red Sea, Gulf of Aqaba, from fishermen through Coral World, Eilat, J. E. Randall, 8 August 1976.

DIAGNOSIS.—A *Rhinobatos* with a moderately elongate, broad and bluntly round-tipped, angular snout, with a slightly concave margin towards tip; tip of snout not laterally expanded; preoral snout 2.8 times mouth width; preorbital snout 2.3 times distance between spiracles; distance from tip of snout to anterior edge of eye 1.5 in distance



Figure 1. Holotype of *Rhinobatos punctifer*, BPBM 20843, 705 mm, Gulf of Aqaba



Figure 2. *Rhinobatos halavi*. BPBM 28364, 825 mm, Jember



Figure 3. *Rhinobatos thouin*. BPBM 26587, 390 mm, Jakarta

from posterior edge of eye to pectoral axil; rostral ridges of snout broad, thick, widely separated from each other along their lengths, slightly divergent basally but then somewhat convergent anteriorly, not fused together or touching each other over precerebral cavity of rostrum; eyes large, length of eyeball 1.3 times interorbital space, 3.2 in preorbital snout; interorbital space slightly concave; distance from front of eye to rear edge of spiracle about equal to distance between spiracles; spiracles with two moderately strong posterior ridges; nostrils oblique, at about a 57° angle to longitudinal axis of snout; nostrils moderately broad, their width 1.3 in mouth width, 1.9 times internarial space; anterior nasal flaps with medial folds extending onto internarial space but not medial to the excurrent apertures; anterior nasal flap with a long, broad lobe at its midlength; posterior and posterolateral nasal flaps very broad; horizontal distance from lateral edge of incurrent aperture to lateral margin of snout 4.6 in preoral snout; mouth nearly straight, its width 6.7 in distance from snout to vent; first dorsal fin with origin posterior to pelvic bases by distance of 1.5 in interdorsal space, its base 2.5 in interdorsal space, its height about 1.2 times its length; enlarged denticles or thorns obsolete on dorsal surface of body, absent on snout tip and rostral ridges; denticles on scapular region, midline of back, and between and behind dorsal fins minute, blunt, and inconspicuous; rostrum 1.3 times nasobasal length of cranium (from base of rostrum to occipital condyle), its width across nasal capsules 1.3 times nasobasal length; nasal capsules oblique; pectoral fin with 71 radials (including 33 propterygial radials); 179 free vertebral centra behind synarcual; back with regular, symmetrical, wide-spaced, small white spots on head, disc, pelvic fins and tail; no light stripes on snout edge.

DESCRIPTION.—Proportional dimensions of holotype, 705 mm total length, as percentages of total length, are as follows.

Snout to: nostrils, 10.8; eyes, 12.6; mouth 15.9, fifth gill openings, 24.7; pectoral apices, 28.4; pectoral rear tips, 40.9; first dorsal origin, 53.0; second dorsal origin, 72.3; pelvic origins, 35.0; vent, 37.9; upper caudal origin, 64.4.

Distance between: front edge of eye and rear margin of spiracle, 5.4; eyeball to pectoral axil, 18.9; outer edge of nostril to rim of disc, 3.5; first and second dorsal bases, 13.2; pectoral and pelvic bases, 0.6; pelvic and first dorsal origins, 17.7; pelvic and first dorsal bases 14.1; second dorsal

base and upper caudal origin, 7.4; pelvic bases and lower caudal origin, 44.0.

Eye: length of eyeball, 4.0; length of cornea, 3.0; interorbital space, 34.0.

Nostril: diagonal width, 4.5; length, 3.0; internarial, 2.4.

Spiracle: width, 3.3; interspiracular, 5.5.

Mouth: width, 5.7; length, 3.0.

Gill openings: width of first, 1.4; second, 1.6; third, 1.6; fourth, 1.4; fifth, 1.1. Width between first, 12.5; width between fifth, 8.7.

Height of: head at eyes, 3.4; trunk at pectoral insertions, 4.8; trunk at pelvic insertions, 5.0.

Width of trunk at: pectoral insertions, 12.3; pelvic insertions, 8.8.

Pectoral disc width: 33.8.

Pelvic fin: anterior margin length, 10.1; height, 5.5; base length, 9.4; inner margin length, 7.3; length of fin from origin to free rear tip, 16.7.

First dorsal fin: anterior margin length, 11.9; height, 9.5; base length, 5.4; inner margin length, 2.7; length of fin from origin to free rear tip, 8.1.

Second dorsal fin: anterior margin length, 10.8; height, 8.5; base length, 5.5; inner margin length, 2.4; length of fin from origin to free rear tip, 7.8.

Caudal fin: dorsal margin length, 15.2; preentral margin, 7.4.

Snout broadly wedge-shaped, angle in front of eyes 66°; fifth gill openings about $\frac{2}{3}$ length of first 4; posterolateral nasal flaps extending from posterior margin of incurrent apertures to inner third of excurrent aperture; tooth row counts 76/22 or 37–1–38/34–38; teeth with low, oval, transversely elongated crowns, indistinct cutting edges, no transverse ridges, strong basal ledges and grooves, and small roots, regularly increasing in size from symphysis to mouth corners and not abruptly enlarged in symphyseal region; disc width 87% of disc length; tail from vent to caudal tip 1.6 times snout-vent length, nearly flat below, rounded above, and tapering to caudal fin, its width at pelvic insertions 1.6 times distance between spiracles; tail with lateral dermal folds originating slightly anterior to free rear tips of pelvics and reaching just behind lower caudal origin, widths of folds opposite interdorsal space about $\frac{1}{7}$ of eyeball length.

First dorsal fin slightly larger than second, both triangular, with slightly convex anterior margins, narrowly rounded or pointed apices, concave, nearly vertical posterior margins, angular, slightly pointed free rear tips, and convex inner margins; inner margins of dorsal fins $\frac{2}{5}$ to $\frac{1}{2}$ length of ba-

ses; interspace between second dorsal base and upper caudal origin 1.3 times length of second dorsal; pelvic fins with slightly convex anterior margins, narrowly rounded apices, convex posterior margins, narrowly rounded free rear tips, straight inner margins, and free rear tip angles of about 128°; pelvic lengths from origins to free rear tips 1.8 times base lengths; caudal fin with upper origin slightly anterior to lower origin, dorsal margin convex and with length about 1.2 times interdorsal space, broadly convex preventral margin, broadly rounded ventral apex, undulated postventral margin, and angular dorsal apex; caudal fin without ventral lobe, with axis at about a 16° angle above body axis; epaxial lobe of caudal as high as hypaxial lobe.

Dermal denticles minute, close-set, covering entire body except for area behind posterior nasal flaps on snout, upper lip, and chin, and at pectoral, pelvic, and dorsal fin axils; lateral trunk denticles above the pelvic fin bases with wedge-shaped crowns, low but strong medial ridges, sometimes low lateral ridges, and broad, blunt medial cusps; one or two small, inconspicuous, blunt denticles or thorns present on scapular region; similar denticles at front edges of eyes and along supraorbital ridges.

Rostral cartilage broad, its shaft nearly uniformly wide behind rostral node; rostral appendices broadly expanded and rounded, not angular; rostrum enclosing a broad precerebral cavity that tapers only slightly to rostral node; dorsal edges of precerebral cavity (rostral ridges on surface of snout) broadly separated along their lengths; nasal capsules large, their transverse axes anterolaterally directed; width across nasal capsules 1.3 times nasobasal length of cranium (base of rostrum to occipital condyles); length of nasal capsules about equal to their width; basal plate narrow, its width at anterior ends of orbits 0.2 times in nasobasal length; cranial roof with small, keyhole-shaped frontal fenestra, well behind anterior fontanelle; antorbital cartilage triangular, broad, and wedge-shaped posteriorly, without an anterior lobe extending past nasal capsules; postorbital processes large and bifurcate; preorbital processes poorly differentiated on supraorbital crests; width across postorbital processes 0.6 times nasobasal length; width across otic capsules 0.4 times nasobasal length.

Pectoral fin skeleton with 33 propterygial, 6 mesopterygial, 2 neopterygial, and about 30 metapterygial radials; anteriormost radials of pro-

pterygium reaching in front of base of nasal capsules by about 0.08 of rostral length; pelvic girdle medially arched, with short, broad lateral prepubic processes and narrow, falcate iliac processes; pelvic fin with about 26 radials.

Vertebral column with cervicothoracic synarcual having 15 centrum-free segments and 14 centra (29 total), 27 monospondylous precaudal centra behind synarcual (most with elongate, slender ribs), 104 diplospondylous precaudal centra, and 48 caudal centra; total segments 208 and total centra 193; intestinal valve of spiral type, with 11 turns.

Color in preservative medium brown on dorsal surface of disc and tail, cream below; rostral ridges darker but with a light area on either side of rostrum; small light spots, the largest about 5 mm wide, mostly arranged in sparse, transverse rows on dorsal surface of head, disc, pelvic fins, and tail in front of second dorsal base; underside of preoral snout with a dusky blotch.

DERIVATION OF NAME.—Latin *punctifer*, bearer of spots, for the prominent regular pattern of white spots on the dorsum.

COMPARISON WITH OTHER SPECIES OF *RHINOBATOS*.—As noted above *Rhinobatos punctifer* is closest to seven species of Eastern Hemisphere *Rhinobatos* included by Norman (1926, 1930, 1931) in the subgenus *Leibobatos* (= *Rhinobatos*). Of these, *Rhinobatos rhinobatos* occurs in the Mediterranean Sea and eastern Atlantic. It differs from *R. punctifer* in having a more angular, narrow-tipped, bottle-shaped snout; rostral ridges closer together; nostrils smaller, with widths 1.1 to 1.3 times internarial space, 1.7 in mouth width; supraorbital, scapular, and mid-dorsal thorns well developed; distance from first dorsal origin to pelvic bases 1.1 in interdorsal space; and no white spots. Two specimens of *Rhinobatos rhinobatos* BM(NH) 1935.3.5.1, a 487-mm female, and BM(NH) 1936.4.14.44, a 478-mm immature male, were examined for this study.

Two West African species of this group, *Rhinobatos albomaculatus* and *R. irvinei* (descriptions by Norman 1930, 1931), have white spots like *R. punctifer*; the holotypes (*R. albomaculatus*, BM[NH] 1930.3.24.2, 566-mm female; *R. irvinei*, BM[NH] 1930.8.26.3, 569-mm adult male) were examined. These two species differ from *R. punctifer* in having more acutely angular, narrow-tipped snouts; narrower, more closely confluent rostral ridges; smaller eyes, 4 to 4.8 times in pre-

orbital snout; smaller, more widely spaced nostrils, 1.3 times internarial space and 1.7 to 1.9 in mouth width; and first dorsal base 3.1 to 3.3 in interdorsal space. *Rhinobatos irvinei* also differs from *R. punctifer* in having dark spots on the interorbital space and small but prominent supraorbital, scapular, and middorsal denticles. Both *R. albonaculatus* and *R. irvinei* were placed in the genus *Rhynchobatus* by Bigelow and Schroeder (1953) because of their supposedly notched tails with ventral caudal lobes, but both holotypes of these species proved to belong to *Rhinobatos*, having damaged, artificially notched tails.

Rhinobatos holcorhynchus is an Indian Ocean, South African species similar to *R. punctifer* and redescribed by Norman (1926) and Wallace (1967). It differs from *R. punctifer* in having a longer, narrower snout with the preorbital length 2.8 times the interspiracular space; the distance from first dorsal origin to pelvic bases 1.3 in interdorsal space; large supraocular, scapular, and middorsal thorns; and no white spots.

Rhinobatos annandalei and *R. lionotus* are two similar species described by Norman (1926) from the Bay of Bengal. They are close to *R. punctifer* but differ from it in having narrower snout tips; rostral ridges much closer together; nostrils smaller and more widely separated, 1.7 in mouth width and 1.3 times internarial space; and no white spots. *Rhinobatos annandalei* additionally differs by having conspicuous, sharp-tipped superocular, scapular, and middorsal thorns, and *R. lionotus* by having the first dorsal origin posterior to the pelvic bases by a distance equal to the interdorsal space.

Three western North Pacific species, *Rhinobatos schlegelii*, *R. hynnicephalus*, and *R. formosensis* are similar to *R. punctifer*, but all differ in having narrower-tipped snouts with rostral ridges close together; smaller nostrils, 1.2 to 1.5 times internarial space and 1.4 to 1.7 in mouth width; and origin of first dorsal posterior to pelvic bases by 1.0 to 1.3 times in interdorsal space. *Rhinobatos schlegelii* and *R. formosensis* additionally differ in their much longer snouts, with the preorbital snout 3.1 to 3.3 times interspiracular, preoral snout 3.3 to 3.7 times mouth width, and plain coloration; *R. schlegelii* in its more bottle-shaped snout and weak spiracular ridges; and *R. hynnicephalus* in its smaller eyes, 4.7 to 5.8 in preorbital snout, and dorsal color pattern with rosettes of dark spots but no white spots. Apparently, there

are no confirmed records of *R. schlegelii* in the Red Sea or even the Indian Ocean, that of Gohar and Mazhar (1964) from Egypt being based on *R. punctifer* and that of Fowler (1956) from Oman uncertain. According to Norman (1926), *R. schlegelii* has been confused with *R. lionotus*, as well as with the western Pacific *R. formosensis* and *R. hynnicephalus*.

Among other species of *Rhinobatos* in the Red Sea, *R. halavi* was recorded as very common off Egypt (Gohar and Mazhar 1964) and was collected in 1982 by the junior author at Jeddah, Saudi Arabia. *Rhinobatos halavi* differs from *R. punctifer* in its shorter, more acutely angular snout; rostral ridges closely adjacent to each other along their lengths; smaller eyes; lower spiracular ridges; anterior nasal flaps not extending onto the internasal space; enlarged rostral, supraorbital, scapular and middorsal thorns; and plain coloration. The other Red Sea species, *R. thouin*, has not been recently reported from the Red Sea and its presence there requires confirmation. It is easily separable from *R. punctifer* by its extremely elongate, attenuate snout (the preorbital snout 3.3 to 3.7 times the interspiracular space) with laterally expanded tip (unlike that of any other living rhinobatoid). It also has narrow, closely spaced rostral ridges; weak spiracular ridges; narrower nostrils, with very small and narrow anterior, posterior, and posterolateral nasal flaps; anterior nasal flaps not extending medially onto the internarial space; enlarged rostral, supraorbital, scapular, and middorsal thorns; and plain coloration.

NOTES ON THE RED SEA BATOID FAUNA

We preface remarks on the Red Sea batoid fauna with a checklist of species, mostly compiled from available literature (including Fowler 1956; and Gohar and Mazhar 1964). The ray fauna of the Red Sea is poorly known, more so than the shark fauna, and the following list is tentative:

Order RHINOBATIFORMES

Family RHYNCHOBATIDAE

Rhina ancylostoma (Bloch and Schneider, 1801).
Rhynchobatus djiddensis (Forsskål, 1775).

Family RHINOBATIDAE

Rhinobatos halavi (Forsskål, 1775). *R. punctifer* Compagno and Randall, new species, and *R. thouin* (Anonymous, 1798).

Order PRISTIFORMES

Family PRISTIDAE

Anoxypristis cuspidata (Lathan, 1794), *Pristis pectinata* Latham, 1794, *Pristis zijsron* Bleeker, 1851 (note, photos labeled *Pristis pectinata* in Gohar and Mazhar, 1964 apparently are of *P. zijsron*, hitherto not known from the Red Sea).

Order TORPEDINIFORMES

Family TORPEDINIDAE

Torpedo panthera Olfers, 1831, *T. sinuspersici* Olfers, 1831.

Order MYLIOBATIFORMES

Family DASYATIDIDAE

Himantura gerrardi (Gray, 1851), *H. imbricata* (Bloch and Schneider, 1801), *H. uarnak* (Forsskål, 1775), *Hypolophus sephen* (Forsskål, 1775), *?Taeniura grabata* (St. Hilaire, 1809), *T. lyoma* (Forsskål, 1775), *T. melanospilos* Bleeker, 1853, *Urogymnus asperimus* (Bloch and Schneider, 1801).

Family GYMNURIDAE

Aetoplatea tentaculata Valenciennes in Müller and Henle, 1841, *Gymnura poecilura* (Shaw, 1804).

Family MYLIOBATIDAE

Aetobatus narinari (Euphrasen, 1790), *Aetomylaeus milvus* (Valenciennes, in Müller and Henle, 1841).

Family MOBULIDAE

Manta ehrenbergi (Müller and Henle, 1841) or *M. birostris* Walbaum, 1792), *Mobula kuhlii* (Valenciennes in Müller and Henle, 1841) or *M. diabolus* (Shaw, 1804).

Like the Red Sea shark fauna, the batoid fauna of the Red Sea is relatively depauperate with fewer species than the western Indian Ocean and with the fauna comprising coastal-benthic, coastal-pelagic, and epipelagic species. There are no deep-water Red Sea rays and no Red Sea members of the order Rajiformes, although deep-sea rays including rajoids occur in the Gulf of Aden. Of the 24 species listed above, 22 are also found in the western Indian Ocean. The ones not known from this region are *Rhinobatos punctifer* and the dubiously recorded *Taeniura grabata* (otherwise known from the Mediterranean Sea and eastern Atlantic). Three of the Red Sea batoids are circumtropical in distribution: *Pristis pectinata*, *Aetobatus narinari*, and *Manta birostris* (providing *M. ehrenbergi* is a junior synonym of it). If the

West African *Urogymnus africanus* is a junior synonym of the Indo-Pacific *U. asperimus*, then it too ranges beyond the Indo-West Pacific region. Compared to the Red Sea shark fauna, the Red Sea batoids have a much lower proportion of epipelagic and circumtropical species and more Indo-West Pacific species. *Rhinobatos punctifer* is currently the only known endemic Red Sea elasmobranch, but it may eventually be collected in the northwestern Indian Ocean. On the other hand, it may prove to be confined to the cooler northern part of the Red Sea. *Taeniura grabata* is a species otherwise known from the Mediterranean Sea and eastern Atlantic, but records of it from the Red Sea are apparently doubtful (Kreff and Stehmann 1973).

The nature of the Red Sea batoid fauna may be due to restrictive conditions in the Red Sea environment, limiting inshore species that can live there and barring deep-water species. Presumably, the Red Sea batoid fauna originated by dispersal from the western Indian Ocean.

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ADDITION

While this paper was in production, an additional specimen of *Rhinobatus punctifer* was collected in the Gulf of Aqaba. We add this specimen here as a paratype for the Hebrew University of Jerusalem (HUJ). It is HUI 11733, 645 mm total length, taken with a gill net off Coral World, Eilat, at a depth of 240 m by Eli Kalmanson on 14 November 1986.